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# CONNECTICUT

# AGRICULTURAL EXPERIMENT STATION

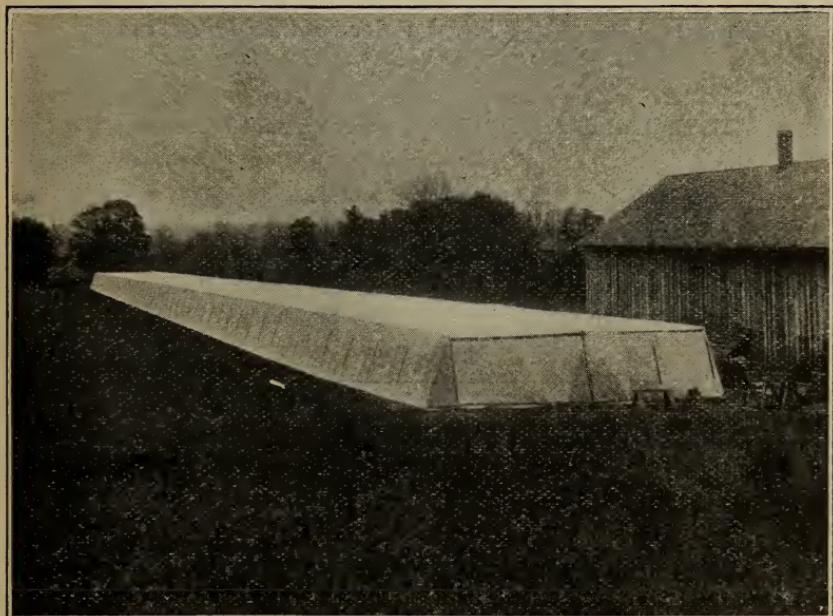
NEW HAVEN, CONN.

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BULLETIN 137, FEBRUARY, 1902.

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## The Growing of Tobacco Under Shade in Connecticut.



The first crop of shaded Sumatra ever raised in the Northern States was grown under this shade, in 1900, by the Agricultural Station of New Haven, on land of the Conn. Tobacco Experiment Co.

Experiments on fertilizing, raising, curing and fermenting tobacco have been carried out on this land for nine successive years by the Agricultural Station.

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CAN WRAPPER LEAF TOBACCO OF THE SUMATRA  
TYPE BE RAISED AT A PROFIT  
IN CONNECTICUT.

By E. H. JENKINS.

For the past nine years this Station has carried out experiments on the fertilization, curing and fermentation of wrapper-leaf tobacco. These experiments have been made at Poquonock, in the town of Windsor, with the coöperation of the Connecticut Tobacco Experiment Co., an association of tobacco growers, and on land belonging to this company, but placed entirely at the disposal of the Station for a term of years. During the whole time, with the exception noted below, the experiments have been planned and directed by the writer and the field work has been entirely under the direction of Mr. John A. DuBon, of Poquonock, a tobacco grower of many years' successful experience, to whose special knowledge and skill the success of the experiments has been in large measure due. The results of this work, year by year, have been published in the reports of this Station, and, we believe, have largely influenced the methods and practice of successful tobacco growers.

Sumatra tobacco has, from time to time, been raised experimentally in this State in very small amount, in the same way that the "Connecticut Havana" and "Broadleaf" varieties are raised, but the cured leaf had none of the valuable qualities of that raised on the island of Sumatra.

In the year 1900, this Station undertook to determine whether wrapper-leaf tobacco of the Sumatra type, and which would compare favorably with the imported article, could be raised in Connecticut, by other methods than those commonly employed. Prof. Milton Whitney, of the Division of Soils, coöperated with the Station in the experiment, by paying a portion of the expense, furnishing the seed, and giving the services of Mr. M. L. Floyd, who superintended the harvesting of the leaf and later the process of fermentation. The Station furnished the land, fertilizers and labor, paying the larger part of the expense, and put in charge of the field work Mr. DuBon, who devised, built and covered the frame; cultivated, harvested and cured the crop.

The method followed was to raise the Sumatra crop in a field completely covered and closed in on all sides with thin cheese-cloth, supported by a frame nine feet high. This method had already been successfully practiced in Florida for some years. Full descriptions of the construction of this shade and of the conduct of the experiment are given on pages 322 to 329 of the Twenty-fourth Report of this Station for the year 1900.

The conclusions reached were as follows:

"No further evidence is required to demonstrate that tobacco of the Sumatra type can be raised in Connecticut which is equal in all respects to the average imported Sumatra.

To determine whether this could, or could not, be done was the object, and the *only* object of this experiment.

It remains to be seen whether such tobacco can be *economically* raised in Connecticut; raised on a considerable scale *at a profit*. To determine these points will probably require some years of experiment.

We would strongly urge farmers not to undertake to raise Sumatra tobacco under shade at present, in anything more than a very small way, and purely as an experiment, which will not seriously cripple them, even if it is a complete failure.

The Station proposes to continue these experiments on a somewhat larger scale, so as to get some data to show the cost of making the shade and of harvesting, and also to show the yield of shaded Sumatra per acre."

This was the first experiment made on the subject in the northern states, as far as we can learn. Certainly it was the first experiment of which both the methods followed and the results obtained were accessible to the public.

Encouraged by the success of this experiment, which was promptly described in detail in the Station Report, and in accordance with advice given in that report, at least twenty-one tobacco growers of this State planted more or less Sumatra tobacco under shade, in 1901. More than fifty acres in all were thus planted. Messrs. Ariel and Joseph Mitchellson of Tariffville raised the largest amount, about eighteen acres, while some others raised only one-twentieth of an acre.

Though little of this tobacco has been sold at this date, February 1st, the apparent success of the work has been such that several companies have been organized to raise Sumatra tobacco on a considerable scale, and it is not unlikely that approximately one thousand acres of shaded tobacco will be raised in the Connecticut Valley in 1902.

In most cases, growers have availed themselves of the assistance of Mr. M. L. Floyd and other experts in the employ of the U. S. Department of Agriculture, who have watched or superintended the putting up of the shade and all the work of planting, cultivating, harvesting, curing and fermenting during the season of 1901.

#### THE STATION EXPERIMENTS OF 1901.

These were managed wholly by Mr. John A. DuBon of Poquonock and the writer. The objects were to raise a larger crop of Sumatra than was raised in the previous year, to learn more definitely both the extra cost of raising a crop under shade and also the yield of tobacco, and to test both the convenience and the effect on quality, of cutting and hanging the plants in the usual way instead of picking the leaves ("priming"), and curing them apart from the stalk. It was also sought to avoid the mistakes of the previous year—mistakes incident to a first experiment—when the leaves were harvested before they were sufficiently ripened, and were not thoroughly fermented. We believed also that the leaf could be made more serviceable and the cigar-wrappers made from it would be less likely to break in the box or in the hands of the smoker if the crop were so grown as to give the leaf more body.

It should also be said that this experiment was made for the information of the tobacco growers of this State. It is our aim, therefore, to state exactly the facts regarding it, whether favorable or unfavorable to the prospects of the new industry. It is not likely that the growing of the Sumatra type of leaf in this State can be made a complete success without some years of experience and intelligent experiment.

A fictitious "booming" of the business at the outset will certainly be followed by a correspondingly irrational depression later.

#### *The Shade.*

The frame-work already standing, built in 1900, was extended so as to cover an acre of land.

In this extension, the 4" × 4" uprights supporting the frame were set 11 feet 10 inches apart in the row, the rows of posts themselves being 13 feet 4 inches apart. The posts in each row

were fastened together by  $2'' \times 4''$  scantling, nailed flat on top of the posts, and each post was fastened to the posts opposite to it in adjoining rows by  $2'' \times 4''$  scantling nailed on the sides of the posts, with the edge of the scantling flush with their tops. Scantling  $2'' \times 5''$  and 20 feet long were also nailed to the outer rows of posts, close to the ground, on the outside.

At one end of the shaded field was an eight-foot doorway, closed with cheesecloth, through which teams could enter.

Wire was tightly drawn over this frame lengthwise and also crosswise of the structure, midway between each row of uprights. This served as a further support to the cheesecloth cover.

The cheesecloth was 142 inches wide, four one-yard breadths being sewed together, and covering the space between the transverse rows of posts, which had been set 11 feet 10 inches apart. The cheesecloth was fastened to the frame by lath wherever the cloth came in contact with the frame.

We do not recommend this method of construction as superior to others. It certainly is not the most economical, but it answered the purpose perfectly.

### *Fertilizers.*

The land was manured in the fall of 1900 with New York stable manure, 10 tons to the acre, and fertilized after plowing in the Spring of 1901 with 500 pounds of dry fish scrap, 400 pounds of "vegetable ashes," described on page 32 of the Report for 1901, and 1800 pounds of cotton seed meal.

### *Seed and Planting.*

Four different strains of Sumatra tobacco seed were tested in 1901, the main body of the crop, however, being from seed which was grown on the same land in 1900. The seed for the 1900 crop was produced in Florida from seed which came from the island of Sumatra.

In this connection, it should be remarked that Sumatra seed requires for its germination and normal growth in seed-beds much more heat than our New England Havana and Broadleaf varieties. It should also be remembered that Sumatra seed-beds must not be made where seed of the other varieties has been

sown formerly. If they are, there will appear later in the field "mongrel plants" which did not come from the Sumatra seed. They are simply Connecticut Havana plants from seeds which have lain dormant for a year or more in the ground of the seed-bed. The Havana and Sumatra seedlings are not so unlike in appearance as to be distinguished by those who pull the plants for setting in the field.

Through the summer of 1901, and especially at and after harvest time, the land under shade, where the crop of the year before had ripened and shed much of its seed, was thickly covered with young Sumatra plants. These came from seed which fell from the 1900 crop, lay over winter undamaged by the cold, and did not germinate until late in the summer of 1901.

The plants were set under the shade, in rows 3 feet and 3 inches apart, the plants 14 inches apart in the row, or about 11,290 plants to the acre.

This distance in the row is two inches greater than in 1900. Our object was to give the leaf rather more light and thus secure more substance or "body" than we found in the first crop.

#### *Notes During Growth.*

The cultivation and care of the crop while growing was the same usually given to crops of our domestic leaf tobacco.

In July a large portion of Connecticut was swept by a wind storm more violent than had been known for thirty years, accompanied with lightning and a heavy downpour of rain.

It lasted about fifteen or twenty minutes, but in that time uprooted a good many trees, unroofed some houses and threw down tobacco barns in the region of Poquonock.

It was a severe test for the cheesecloth shade. The sides were not injured, but in a good many places on the top the cover was badly torn. The tobacco was not at all harmed and four men in two days' time repaired the damage.

The season in general was a wet one, but the quality of the crop through the State was very good at harvest time; the leaf, however, being somewhat lighter in body than usual because of the wet season.

Regarding the effect of the shade, little need be added to what was said in our last report. It secured protection from insect

bites, from drought, from high winds and from hail, and a slightly higher temperature and moister air for the growing plants. These are commonly regarded as quite incidental to the thinning of the leaf caused by the slight shade of the cheesecloth. The several items do, however, we believe, largely explain the higher value of the shade-grown crop. The climate under this cloth is wholly different from that outside, and even if no sunlight were intercepted by the cloth, the plants grown under it would yet be of different quality from those grown outside.

The suckers were removed but once, about a week before harvesting. If taken off earlier, a number of new suckers start immediately, higher on the stalk, and we believe in the aggregate draw more heavily on the plant than the main sucker which starts nearer the base, where it has less light.

#### *Topping and Suckering.*

About three and a half weeks before harvesting, the whole crop was topped by cutting off the flower stems close to the upper leaf of the main stalks. This was done wholly at Mr. DuBon's suggestion. His experience in growing tobacco convinced him that on account of the shade and the dark rainy weather that had prevailed, the leaf would be too thin and papery unless the shade of the flower stalks was removed and the substance was left in the leaves, which otherwise would go into flower and seed. The result fully justified this belief.

By taking off the flower head much more light was let in, and had a marked effect in ripening the lower leaves. We found that, under this treatment, all the leaves on the stalk ripened much more uniformly than is usual with our domestic tobacco.

#### *Harvest and Curing.*

It is not at all easy for one of limited experience to determine when the leaf is ready to pick. The signs of ripeness can be in general described, but not detected certainly, without long experience. The ripe leaf is likely to be lighter green than the unripe, it shows a yellowish cast on the tip and the edges near the tip, and small spots of darker green appear on its surface. The whole plant at this time takes on a yellowish green shade.

Remembering the misjudgment of the last year when the crop

was picked before it was ripe, we endeavored to err, if at all, in the other direction in 1901.

A part of the tobacco—from 7,800 square feet or a little less than one-fifth of an acre—was picked or “primed” from the stalks in the field, and hung on strings in the way which is commonly known and which has been fully described in our last report. Three primings were made, about seven leaves at each priming, and all were made within three or four days, beginning August 28th.

Four-fifths of the crop was harvested on the stalk three or four days later. To do this, each stalk was cut in two and hung on hook lath, the tops with ten hooks, the bottoms with eight hooks to the lath. These were hung in the barn and cured in the usual way.

Both the primed tobacco and that on the stalk were of necessity cured in one barn; a pernicious, because very dangerous method. It is hardly possible, with all care, to keep the conditions of moisture suited to both kinds. Mr. DuBon, however, managed to cure both sorts without accident and with no damage whatever from pole burn.

#### *Cost of Production—Frame.*

As we built it there was required the following spruce timber, which was bought at the nearest lumber yard:

304 pieces 4"×4"×12'	.....	4,864 feet.
288     “     2"×4"×13'	.....	2,496     “
285     “     2"×4"×14'	.....	2,660     “
42       “     2"×5"×20'	.....	700     “
		10,720     “

In all, 10,720 board feet, which cost, delivered, \$22 per thousand, or \$235.84. This will cover less than a square acre of ground, 42,600 square feet. We actually planted under this shade only  $\frac{93}{100}$  of an acre in tobacco, as was determined by accurate measurement at harvest time. While the estimate for lumber per acre would be probably sufficient for a piece containing several acres, it is perhaps safer to increase it by  $\frac{7}{100}$ , making the initial cost of frame \$252.35. There were also used 8,118 feet of No. 12 galvanized wire, weighing three pounds per 100 feet and costing  $4\frac{1}{2}$  cents a pound, or \$10.96 in all.

We estimate that the cost of putting up the frame, labor, nails, etc., was \$36.00, making the cost of the permanent structure, lumber, wire and labor, \$299.31.

#### *Cover.*

To cover this frame, top and sides, were used 6,207 yards of cheesecloth, "Crown Tobacco Muslin, Tape Selvage," costing \$162.94 ( $2\frac{5}{8}$  cents per square yard). 2,395 lath for fastening down the cover, at \$5.50 per thousand, cost \$13.17. To put on the cheesecloth cover required 83 hours work at 15 cents per hour, \$12.45.

To the above must be added the expense of setting 3,000 extra plants per acre and the extra cost of setting by hand, for machine planting under the shade and at 14 inches was not practicable. The cost of shaping the land would also be a little greater. These extra items are small, but cannot be closely estimated.

#### *Repairs.*

During the growing season in consequence of a wind storm of very exceptional violence \$12.00 were spent in repairing the cloth cover.

#### *Priming.*

The cost of picking the leaves, bringing them to the barn and hanging them after stringing, is probably hardly greater than that of cutting, spearing, teaming and hanging the plants harvested in the usual way. The plants on an acre of land weigh at harvest time about 18,500 pounds, of which 9,500 pounds, or  $4\frac{3}{4}$  tons, are stalks. The work of cutting, spearing, hauling and lifting carefully into place  $4\frac{3}{4}$  tons of stalks is not any less than that of picking the leaves separately, hauling them to the barn and lifting them into place.

The twine used proved perfectly adapted to its use. It was rough enough so that the curing leaves did not slide on it and so strong that there was no breakage during the cure. It is called "16-ply White Peerless Cotton Twine," and cost in 100 pounds lots  $19\frac{1}{2}$  cents per pound. A pound of this twine measures 1,200 feet. Twenty-nine pounds are needed for an acre of tobacco, costing \$5.66.

With 22 leaves to the plant, and 40 leaves on each lath, there are required 6,200 lath per acre. At the price paid by the Messrs. Mitchellson of Tariffville, for efficient labor, viz., 20 cents for stringing 25 lath, the approximate expense of stringing would be \$49.60 per acre and this rate is said to pay the labor \$1.35 to \$2.00 per day.

To hang the tobacco from an acre in the usual way on the stalk, requires about 1,200 lath. The method of priming therefore requires 5,000 extra lath per acre, costing, at \$5.50 per thousand, \$27.50.

Allowing 8 inches between lath when tobacco is hung on the stalk and 5 inches when the leaves only are hung, 900 running feet of hanging poles are needed in the former case and 3,100 in the latter; but since two tiers of leaves can be hung where only one of stalks can hang, the disproportion is much less; that is, an acre of primed tobacco takes up as much room in the barn as 1.7 or 1.8 acres of tobacco hung on the stalk.

The disproportion may be made even less, for when the primed leaves are fully wilted and have begun to cure there is often advantage in pushing the lath closer together than they were hung at first. Primed tobacco is much more likely to "hay down," dry out too quickly, than that cured on the stalk.

Where there is a considerable acreage of tobacco, as there was at Tariffville, and the harvesting lasts over a period of five or six weeks, two lots of tobacco can be cured in the same barn, the first harvesting being cured and taken down by the time the last harvesting is ready to go in.

When it is time to take down and strip, the advantage is very greatly with the primed leaf. Certainly, if we count the saving of labor at this point the cost of harvesting by priming is no greater than the cost of harvesting in the usual way, except for the items of stringing and extra lath required. When the primed leaves are cured the string can be cut at each end, wound around the butts, thus making a hand of it, and put in bundles, or the leaves can be drawn from the string and bundled loose. Stripping and bundling can be done much more quickly, easily and neatly when the leaves are primed. The danger of getting the leaf out of condition or bruised is also much less.

To summarize the *extra* cost of growing, harvesting and curing Sumatra wrapper leaf under shade:

Cost per acre of lumber.....	\$252.35
Cost per acre of wire .....	10.96
Cost per acre of construction.....	36.00
	<hr/>
	\$299.31

Assuming that the frame will last for five years, there should

be charged to each crop one-fifth of this sum, or..... \$ 59.86

Lath for fastening the cloth..... 13.17

Cost of cheese cloth..... 162.94

Labor of putting on cloth .....

12.45

Repairs .....

12.00

Twine for stringing leaves .....

5.66

Stringing the picked leaves..... 49.60

Extra lath for stringing .....

\$27.50

Charging 40 per cent of this to the crop..... 11.00

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Total..... \$326.68

But the actual *extra outlay of the first year* for shading and harvesting was \$582.63 per acre.

To this there must be added a suitable amount for refitting the curing barn to hold the primed leaves, and unless the area planted is quite large, there will be needed extra barn room.

These figures show very closely the actual extra cost to us of raising and curing an acre of shaded Sumatra tobacco in this year.

Other experimenters have spent very considerably less. The chief economies are in getting out the needed posts from the owner's wood lot, in setting them further apart, and in using farm labor for putting up the frame, when other work is not pressing.

The cost of stringing the leaf would be somewhat reduced if the farm labor was used for it as far as possible.

A main economy is in construction.

It has been shown by the experience of others to be perfectly feasible to set the 4" X 4" uprights a rod apart each way, and to buy them, of chestnut, for not more than 25 cents apiece, delivered.

The lumber for an acre would then be:

205 posts, 4" X 4" X 12', @ 25¢.....	\$51.25
200 pieces, 2" X 4" X 17', 2,267 board feet @ \$22.....	49.87
1,452 running feet 2" X 5", 1,210 board feet @ \$22 .....	26.62
	<hr/>
Total.....	\$127.74

This is one hundred and twenty-four dollars less per acre than we paid.

The 2"  $\times$  4" scantling are nailed on the tops of the posts, running lengthwise of the field, but the posts, crosswise of the field, are only bound by wire. The cheesecloth cover is woven 200 inches wide.

#### *Yield of Pole-cured Tobacco.*

The cured leaf was taken down in rather high case on September 29th. *The primed leaf* weighed, in the bundle, at the rate of 1,258 pounds net per acre, less by 250 pounds than the crop of last year, when the plants stood 2 inches closer in the row, but which was calculated from only one-sixth of an acre.

The leaves were taken from the strings and sized without other sorting than to throw out badly torn or otherwise damaged leaves. The hands were then tied with bast fiber.

Unfortunately it was not possible to put the tobacco into fermentation at once, as was desired, and it therefore lay in a cold place till December 4th.

On this date each lot was carefully weighed before putting it into the bulk, deduction being made for the papers and twine which were about the bundles.

The tobacco had dried out somewhat and the net weights were as follows:

Primed shaded Sumatra, 206½ pounds from 7,820 square feet of land, which is at the rate of 1,150 pounds per acre.

Shaded Sumatra cured on the stalk, 883 pounds from 32,300 square feet of land, which is at the rate of 1,190 pounds per acre. Sumatra raised in the open field, set at the same distance as that under shade, cured on the stalk, 184 pounds from 6,552 square feet of land, which is at the rate of 1,223 pounds per acre.

#### *Fermentation of the Crop in Bulk.*

In November, 1898, the writer made a test of fermenting Connecticut Havana leaf in a pile or bulk; a method practiced in other countries and in Florida, but which had not been practiced in this State, nor previously tested with tobacco of the type grown in New England to his knowledge. At all events, general attention had not been called to the method or its results. The

wrappers fermented in this way were pronounced by leaf dealers to be well sweated and to have the odor of "aged" tobacco, without the sweet smell of "forced-sweat" leaf. The account of this was published in the Station Report for 1898.

In 1899, with the coöperation of the Division of Soils of the U. S. Department of Agriculture and under Mr. M. L. Floyd's superintendence, the experiment was repeated on a larger scale with our tobacco crop of that year, weighing about 3,000 pounds. This work was done at the Station in New Haven.

A full description of the whole operation is given in the Station Report for 1899, pages 291 to 297. The results were most gratifying and successful.

Having demonstrated in this test the value of the method, the experiment crops of 1900, including the shaded Sumatra, were fermented in bulk, at Mr. DuBon's, under Mr. Floyd's superintendence.

With these experiences as a guide, Mr. DuBon and the writer undertook to ferment the experimental crops of 1901, together with two or three small lots of tobacco which had been sent to us by other growers. The whole amount of tobacco was quite small, amounting to a little over 2,000 pounds.

The detail of the operation need not be described, as it was in general the same as described in our Report for 1899, pages 291 to 297.

Electrical thermometers were placed in the bulk, but the telephone instrument soon ceased to work, so that no temperature record could be kept.

The bulk was made December 4th, 1901, five feet wide and ten feet long. Fermentation began promptly and went on satisfactorily. The bulk was a very small one and, as it was evident on examination that the heat was not excessive within it, no change was made till December 19th. We believe that unless there are signs of damage, or the heat rises too high, there is no advantage in turning the bulk and exposing it to the air during the early stages of the fermentation.

On December 19th the bulk was built over in the usual way, the leaf which was outside in the first bulk being put inside the second.

Nothing more was done till January 15th, 1902, when the bulk was taken down, and the leaf, now well fermented, was cased for shipment and sale.

*Casing and Selling the Crop.*

The leaf which was cured on the stalk was, of course, marked in the bulk and separated by strings from that which had been "primed" and cured on strings.

Large samples were taken to submit to experts and for exhibition and what remained was cased and shipped to Messrs. L. B. Haas & Co. of Hartford, for sale. The amount shipped for sale was as follows:

Of the stalk-cured leaf there were:

133½	pounds of 20 inch leaf.
219	" " 18 "
59½	" " 17 "
50½	" " 16 "
116	" " 15 "
202½	" " 14 "
44½	" " 12 "
<hr/>	
825½	

Of the primed leaf there were:

31½	pounds of 18 inch leaf.
44	" " 17 "
50	" " 16 "
29	" " 15 "
16	" " 14 "
11	" " 12 "
<hr/>	
181½	

This leaf was packed in boxes, holding from 90 to 120 pounds each. It was not baled or "fanned out" in imitation of the imported leaf, but was handled precisely as the domestic leaf is.

Mr. Haas was instructed to sell it in single boxes, the object being to secure its distribution to as many manufacturers as possible and to get from them, if possible, after they had manufactured it, an expression of their judgment of it.

The sale was embarrassed by the fact that there was absolutely no precedent or standard of prices to serve as a guide. This is the first crop of Connecticut Sumatra ever offered in the market, if we except the two hundred pounds sold by the Station last year. The prices asked were, however, accepted by buyers without objection, and indicate, therefore, that those who bought a portion of the crop believed that it was worth, to them, at least as much as they paid.

The actual sales made will appear at the end of this Bulletin.

### CONCLUSIONS.

In conclusion, our success with two crops, the first raised during a season so dry as to affect the growth of tobacco in the open, the second raised when the latter part of the season was unusually cloudy and wet, indicates that Sumatra tobacco can be successfully produced in Connecticut under shade in any season which is not very abnormal as to rainfall and sunshine.

It is, however, a new industry which must be slowly learned by our growers. While much may be acquired from the prevailing ideas and practices in Sumatra and in Florida, there yet remains much more which is absolutely necessary to success but which our growers must learn for and by themselves.

The adaptation of methods of raising, harvesting and curing the leaf to the special local conditions of labor and particularly to the peculiarities of our climate during growth, harvest and curing are essentials, to be worked out by our growers and in which no one but themselves can be experts.

We are not raising Sumatra tobacco, nor Florida tobacco, we are not in a Sumatra climate or a Florida climate. To succeed, our farm practice must be that which we find best for this leaf under Connecticut conditions.

#### *The Seed.*

The seed requires for its prompt germination a higher heat than our domestic leaf seed, and also a somewhat higher temperature in the seed-beds. If the beds are made where Havana seed has been sown the year before, many Havana plants will be found later in the field coming from seed which has lain dormant a year and has come up with the Sumatra seeding.

This was a very common experience in 1901 in most of the fields we visited.

#### *The Extra Cost of Raising Shaded Sumatra.*

By this is meant the charges incident to putting up the shade and harvesting the leaf by picking.

As has been shown on previous pages, the actual *initial* cost of the first year for these items in *our experiment* was \$582.63 per acre.

Charging the first crop, however, with only twenty per cent. of the cost of frame, and forty per cent. of the cost of lath for hanging tobacco, the extra cost per acre, per year, incident to raising shaded Sumatra was \$326.68.

It is however possible, in the way we have indicated on page 13, to reduce the *initial* cost in the first year to about \$450 per acre and the average yearly expense to about \$300 per acre.

#### *Yield of Tobacco.*

The weight of the whole crop as it was taken down from the curing barn was not ascertained. Nearly two months later when the leaf was put into the fermentation it weighed at the rate of 1,171 pounds net from an acre most accurately measured.

Last year from a measured one-sixth of an acre there were raised at the rate of about 1,500 pounds per acre. Most growers this year report crops of from 1,500 to nearly 1,700 pounds. No doubt our own crop weighed somewhat more at stripping time than it did two months later when it was assorted. We purposely set our tobacco plants farther apart this year than last and are satisfied that we got a better quality by so doing.

#### *Fermentation.*

The process of fermenting requires a room which can be kept at a uniform temperature in all kinds of weather and in which the air can be kept as moist as is desired. Such facilities are not generally obtainable on the farm. But with them the process of fermentation is nothing which an intelligent grower or dealer cannot learn for himself with some experience.

Our crop of 1901, fermented by ourselves as already described, was examined by a considerable number of dealers of experience, all of whom pronounced it well fermented and in excellent order.

#### *Havana Seed Leaf and Broadleaf under Shade.*

About forty plants of each of these varieties were raised under shade and the fermented leaf given to a manufacturer of first-class cigars who in his own trade used exclusively imported Havana filler and Connecticut Broadleaf wrapper. The colors were excellent and the leaf very fine.

From exactly one-half pound of shade-grown Havana were wrapped 172 cigars of ordinary size, equivalent to 2.9 pounds of leaf to 1,000 cigars. Of the Broadleaf were required three pounds and a very small fraction, to wrap the same number of cigars. Of Broadleaf grown without shade from nine pounds upwards are needed per one thousand cigars.

The manufacturer stated, however, that the shaded Broadleaf

did not have the same elasticity as that grown in the open. When the cigars dried the wrapper did not contract along with the filler but became loose, the filler shrinking away from it.

#### *Sumatra Leaf Raised Without Shade.*

This was set at the same distance as the shaded crop. It was harvested considerably later than the other and was sacrificed in the cure, as the main crop needed drying out and airing just when this leaf needed to be kept damp. The product was comparatively worthless.

Sumatra tobacco properly grown without shade and well cured might make a serviceable wrapper, but the chance is not sufficiently encouraging to make further trials worth while at present.

#### *Topping the Plants.*

As has already been noted, we are perfectly satisfied that in this season, at least, topping decidedly improved the crop and made it ripen more evenly from top to base of the stalk. The topping, unlike topping a crop of domestic Havana, is done when the plants are in full flower and a few weeks before harvest. The leaf this year is certainly more elastic and less papery than last year.

#### *Quality of Crop.*

In the opinion of competent judges of Sumatra tobacco the leaf raised by us under shade in 1901 is much better than that raised on the same land in 1900. The green colors, so prominent in 1900, are almost entirely wanting in our crop of 1901. The 1901 leaf has much more "body," elasticity, or "life" than that of 1900 and will, therefore, be more acceptable to manufacturers.

It is equally important to note the defects. Our leaf lacks finish, would be better if it had still more "body," and the colors are rather dull. Careful tests showed that one and a quarter pounds of leaf would wrap 1,000 cigars.

A leaf with more body, of which two pounds wrapped 1,000 cigars, would, other things being equal, be preferable. The burn of the leaf is satisfactory and would improve by aging.

#### *Stalk-cured compared with "Primed" Leaf.*

Samples of hands of the various lengths, from both sorts, marked for identification, about a dozen hands in each lot, were submitted to Messrs. Darius Ferry, Jr., Seymour & Son, and

Sutter Bros. of New York, with the request to decide which lot was the better. They were not told of the difference in the curing of the two lots.

After full examination they unanimously agreed that Lot A, primed, was decidedly better than Lot B, cured on the stalk.

Both lots were of excellent quality. The stalk-cured had lighter colors, but was more papery and had less elasticity and "body" than the primed leaf. Weight for weight, Lot A would cover more cigars than Lot B.

Unquestionably more leaf is damaged when the plants are cut than there is when the leaves are picked or "primed."

Our experience shows that if the plants are cut they should be wilted on hurdles before carting to the barn, as in the unwilted condition they are extremely brittle.

We intend to repeat the experiment, believing that by getting more body into the leaf, by suitable arrangements for carting the plants without breakage, and by curing the plants in a barn where there is no primed tobacco to interfere with the other, it will be possible to make stalk-cured Sumatra leaf of more desirable quality than this year.

Finally, the real value and the standard price for Connecticut Sumatra has not yet been established, nor (in the opinion of the writer) can it be until the leaf has passed from the dealer to the manufacturer, and has been worked into cigars and tested by the consumer. The verdict of all three is needed to fully determine the value of this new grade of wrapper leaf.

At present, however, there is every reason to believe that the leaf can be sold at paying prices and that the new industry, first introduced by the experiments made by us in 1900, may be so managed as to be of great value to the tobacco growers of this State.

### *Sales.*

At the time of going to press there have been sold:

Case No.	Kind of Leaf.	Price per pound.	Total.
11—90	pounds primed leaf.....	@1.75	\$157.50
12—90½	" " " .....	@1.75	158.37
3—90	stalk-cured leaf .....	@2.50	225.00
5—89	" " " .....	@2.25	200.25
8—101	" " " .....	@1.40	141.40

Average price per pound, \$1.91.